Stephen Joseph WRIGHT

Date of Birth: 28 December 1960, Mackay, Queensland, Australia.

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Degrees:

B.Sc. with First Class Honours in Mathematics (Numerical Analysis), University of Queensland, Australia (2/78–12/81). Awarded University Medal for 1981.

Ph.D., Mathematics Department, University of Queensland (2/82–10/84).

Positions:

University of Queensland: Mathematics Department, Tutorial Assistant (2/82–12/84); Research Assistant (2/84–12/84)

University of Arizona: Electrical and Computer Engineering Department, Postdoctoral Fellow (12/84–8/85); Mathematics Department, Visiting Assistant Professor (8/85–6/86)

North Carolina State University: Mathematics Department, Assistant Professor (6/86–6/90; on leave 9/88–7/89), Associate Professor (on leave 7/90–6/91)

Argonne National Laboratory: Mathematics and Computer Science Division, Research Associate (9/88–7/89), Computer Scientist (7/90–3/98), Senior Computer Scientist (3/98–present)

University of Chicago: Computer Science Department, Professor (part-time) (1/00–present)

Professional Societies:

Mathematical Programming Society (Chair of the Executive Committee, 1995–2000)

Society for Industrial and Applied Mathematics (SIAM) (Vice-Chair of Activity Group on Optimization, 1997-2000)

Editorial Positions:

Mathematical Programming, Series A, Associate Editor (1996–present)

Mathematical Programming Society / Society for Industrial and Applied Mathematics Book Series in Optimization, Co-Editor for Continuous Optimization (1999–present)

SIAM Journal on Optimization, Member of the Editorial Board (1994–2000)

SIAM Journal on Scientific Computing, Member of the Editorial Board (1999–present)

Mathematics of Computation, Associate Editor (1995–1999)

Optimization Methods and Software, Associate Editor (1992–1998)

Funding:

1. "Algorithms for Special Nonlinear Programming Problems," jointly funded by NSF DMS-8619903 and AFOSR ISSA-87-0092, $31,500 (7/87–6/89).

2. "Mathematical Sciences Research Equipment," with M. Singer, A. Helminck, M. Shearer. NSF DMS-8803109, $43,900 (5/88–4/89).

3. "(DURIP) Two-Processor Alliant FX/4," AFOSR–890124, with C. T. Kelley, M. Shearer, R. Plemmons. $100,000 (1/89–12/89).

4. "Algorithms for Large Scale Optimization," NSF DMS-8900984, $17,500 (7/89–6/90).

5. "Optimization Algorithms for Advanced Computer Architectures," with L. Biegler, J. Nocedal, and P. Plassmann. NSF ASC–9213149, $484,593 (9/92–8/95).

6. "Algorithms and Software for the National Energy Modeling System (NEMS)", with J. Moré. DOE incremental funding of $400,000 (6/94–6/96).

7. Optimization Technology Center Startup, with other OTC members. DOE incremental funding of $150,000 (10/94–10/96).

8. "Optimization Algorithms for Model Predictive Control," with J. Rawlings. Aspen Technology Inc., $30,000/year (awarded 8/96, renewed annually).

9. "Fast Quadratic Programming Methods for Model Predictive Control," with D. Ralph. Australian Research Council, A$108,000 (awarded 10/96).

10. "Supercomputer Solution of Massive Crystallographic and Microtomographic Structural problems," with I. Foster and others. DOE Grand Challenge Applications Project, $521,000 for first year (awarded 3/97).

11. "Metacomputing Environments for Optimization," with collaborators at Northwestern Univ., Univ. of Wisconsin, Columbia Univ., and Univ. of Chicago. NSF CDA–9726385, $1,796,607 (9/97–8/00).

12. "ACTS Tools for Optimization," with L. Curfman-McInnes, J. Moré and others. DOE2000 Program, $750,000 (awarded 9/97).

13. "Innovative Software for Large-Scale Nonlinear Optimization," with P. Gill. NSF ITR Program, Univ. of Chicago share $328,000 (9/00–8/03).

14. "Improved Minimization Techniques in Meteorological Data Assimilation," with J. Nocedal. NSF, Univ. of Chicago share $198,886 (3/01–2/04).

15. "NGS: Collaborative Research: Performance-Driven Adaptive Software Modeling Techniques," with M. Vernon and others. NSF, Univ. of Wisconsin share $xxx,xxx (6/01-5/04).

Books:

1. Moré, J. J. and Wright, S. J., *Optimization Software Guide*, SIAM Frontiers in Applied Mathematics series, Volume 14, 1993.

2. Wright, S. J., *Primal-Dual Interior-Point Methods*, xx+289 pp., SIAM Publications, 1997.

3. Nocedal, J. and Wright, S. J., *Numerical Optimization*, xx+636 pp., Springer, 1999.

Refereed Papers:

1. Wright, S. J. and Holt, J. N., "Algorithms for nonlinear least squares with general linear inequality constraints," *SIAM Journal on Scientific and Statistical Computing* 6 (1985), pp. 1033–1048.

2. Wright, S. J. and Holt, J. N., "An inexact Levenberg-Marquardt method for large sparse nonlinear least squares problems," *Journal of the Australian Mathematical Society, Series B* 26 (1985), pp. 387–403.

3. Wright, S. J., "Mathematical methods for the seismic inversion problem," *Proceedings of the Center for Mathematical Analysis, ANU, Canberra* 6 (1984), pp. 187–209.

4. Wright, S. J., "Convergence of projected Hessian approximations in quasi-Newton methods for the nonlinear programming problem," *IMA Journal on Numerical Analysis* 6 (1986), pp. 463–474.

5. Wright, S. J. and Holt, J. N., "A new nonlinear least squares algorithm for the seismic inversion problem," *Geophysical Journal of the Royal Astronomical Society* 87 (1986), pp. 1041–1056.

6. Wright, S. J., "Local properties of inexact methods for minimizing nonsmooth composite functions," *Mathematical Programming* 37 (1987), pp. 232–252.

7. Belward, J. A. and Wright, S. J., "Small amplitude waves with complex wave numbers in a prestressed cylinder of Mooney material," *Quarterly Journal of Mechanics and Applied Mathematics* 40 (1987), pp. 383–399.

8. Wright, S. J., "A fast algorithm for equality-constrained quadratic programming on the Alliant FX/8," *Annals of Operations Research* 14 (1988), pp. 225–243.

9. Wright, S. J., Palusinski, O. A. and Guarini, M. W., "Spectral technique in electronic circuit analysis", *International Journal of Numerical Modeling* 1 (1988), pp. 137–151.

10. Wright, S. J., "Convergence of SQP-like methods for constrained optimization," *SIAM Journal on Control and Optimization* 27 (1989), pp. 13–26.

11. Wright, S. J., "An inexact algorithm for composite non-differentiable optimization," *Mathematical Programming, Series A* 44 (1989), pp. 221–234.

12. Plemmons, R. J. and Wright, S. J., "A robust quadratically-convergent algorithm for minimizing a weighted sum of Euclidean norms," *Linear Algebra and its Applications* 121 (1989), pp. 71–85.

13. Wright, S. J., and Pereyra, V., "Adaptation of a two-point boundary value problem solver to a vector-multiprocessor environment," *SIAM Journal on Scientific and Statistical Computing* 11 (1990), pp. 425–449.

14. Wright, S. J., "Implementing proximal point methods for linear programming," *Journal of Optimization Theory and its Applications* 65 (1990), pp. 531–554.

15. Wright, S. J., "Convergence of an algorithm for composite nonsmooth optimization," *IMA Journal on Numerical Analysis* 10 (1990), pp. 299-321.

16. Wright, S. J., "Solution of discrete-time optimal control problems on parallel computers," *Parallel Computing* 16 (1990), pp. 221–238.

17. Kelley, C. T., and Wright, S. J., "Sequential quadratic programming for certain parameter identification problems," *Mathematical Programming, Series A* 51 (1991), pp. 281–305.

18. Wright, S. J., "Parallel algorithms for banded linear systems," *SIAM Journal on Scientific and Statistical Computing* 12 (1991), pp. 824–842.

19. Pereyra, V. and Wright, S. J., "Three-dimensional inversion of travel-time data for structurally complex geology," in *Geophysical Inversion* (J. B. Bednar et al., eds) SIAM, Philadelphia, 1992.

20. Wright, S. J. "Partitioned dynamic programming for optimal control," *SIAM Journal on Optimization* 1 (1991), pp. 620–642.

21. Wright, S. J., "Stable parallel algorithms for two-point boundary value problems," *SIAM Journal on Scientific and Statistical Computing* 13 (1992), pp. 742–764.

22. Wright, S. J., "An interior-point algorithm for linearly constrained optimization", *SIAM Journal on Optimization* 2 (1992), pp. 450–473.

23. Wright, S. J., " Interior point methods for optimal control of discrete-time systems," *Journal of Optimization Theory and Applications* 77 (1993), pp. 161-187.

24. Garner, J., Spanbauer, M., Benedek, R., Strandburg, K. J., Wright, S. J. and Plassmann, P. E., "Critical fields of Josephson-coupled superconducting multilayers," *Physical Review B* 45 (1992), pp. 7973–7983.

25. Wright, S. J., "A collection of problems for which Gaussian elimination with partial pivoting is unstable," *SIAM Journal Scientific Computing* 14 (1993), pp. 231–238.

26. Wright, S. J., "Identifiable surfaces in constrained optimization," *SIAM Journal on Control and Optimization* 31 (1993), pp. 1063–1079.

27. Wright, S. J., "A path-following infeasible-interior-point algorithm for linear complementarity problems," *Optimization Methods and Software* 2 (1993), pp. 79–106.

28. Mattheij, R. M. M. and Wright, S. J., "Parallel stabilized compactification for ODEs with parameters and multipoint conditions," *Applied Numerical Mathematics* 13 (1993), pp. 305–333.

29. Wright, S. J., "Stable parallel elimination for boundary value ODEs," *Numerische Mathematik* 67 (1994), pp. 521–536.

30. Wright, S. J., "An infeasible-interior-point algorithm for linear complementarity problems," *Mathematical Programming, Series A* 67 (1994), pp. 29–52.

31. Monteiro, R. D. C. and Wright, S. J., "Local convergence of interior-point algorithms for degenerate monotone LCP," *Computational Optimization and Applications* 3 (1994), pp. 131–155.

32. Monteiro, R. D. C. and Wright, S. J., "A superlinear infeasible-interior-point affine scaling algorithm for LCP," *SIAM Journal on Optimization* 6 (1996), pp. 1–20.

33. Monteiro, R. D. C. and Wright, S. J., "Superlinear primal-dual affine scaling algorithms for LCP," *Mathematical Programming, Series A* 69 (1995), pp. 311–333.

34. Wright, S. J., "Stability of linear equations solvers in interior-point methods," *SIAM Journal on Matrix Analysis and Applications* 16 (1995), pp. 1287–1307.

35. Wright, S. J., "A path-following interior-point method for linear and quadratic problems," *Annals of Operations Research* 62 (1996), pp. 103–130.

36. Wright, S. J. and Zhang, Y.,"A Superquadratic infeasible-interior-point method for linear complementarity problems," *Mathematical Programming, Series A* 73 (1996), pp. 269–289.

37. Wright, S. J., "Stability of augmented system factorizations in interior-point methods," *SIAM Journal on Matrix Analysis and Applications* 18 (1997), pp. 191–222.

38. Wright, S. J. and Ralph, D., "A superlinear infeasible-interior-point algorithm for monotone complementarity problems," *Mathematics of Operations Research* 21 (1996), pp. 815–838.

39. Ralph, D. and Wright, S. J., "Superlinear convergence of an interior-point method for monotone variational inequalities," in *Complementarity and Variational Problems: State of the Art*, SIAM Publications, 1997, pp. 345–385.

40. Wright, S. J., "Superlinear convergence of a stabilized SQP method to a degenerate solution," *Computational Optimization and Applications* 11 (1998), pp. 253–275.

41. Rao, C. V., Wright, S. J., and Rawlings, J. B., "Application of Interior-Point Methods to Model Predictive Control," *Journal of Optimization Theory and Applications* 99 (1998), pp. 723–757.

42. Jarre, F. and Wright, S. J., "The role of linear objective functions in barrier methods," *Mathematical Programming, Series A* 84 (1999), pp. 357–373.

43. Czyzyk, J., Wisniewski, T., and Wright, S. J., "Optimization case studies on the NEOS Guide," *SIAM Review* 41 (1999), pp. 148–163.

44. Siewert, C. E. and Wright S. J., "Efficient eigenvalue calculations in radiative transfer," *J. Quantitative Spectroscopy and Radiative Transfer* 62 (1999), pp. 685–688.

45. Wright, S. J., "Modified Cholesky factorizations in interior-point algorithms for linear programming," *SIAM Journal on Optimization* 9 (1999), pp. 1159–1191.

46. Czyzyk, J., Mehrotra, S., Wagner, M., and Wright, S. J., "PCx: An Interior-point code for linear programming," *Optimization Methods and Software* 11&12 (1999), pp. 397–430.

47. Ralph, D. and Wright, S. J., "Superlinear convergence of an interior-point method despite dependent constraints," *Mathematics of Operations Research* 25 (2000), pp. 179–194.

48. Potra, F. A. and Wright, S. J., "Interior-Point Methods," *Journal of Computational and Applied Mathematics* 124 (2000), pp. 281–302.

49. Wright, S. J., "On the convergence of the Newton/log-barrier method," *Mathematical Programming* 90 (2001), pp. 71–100.

50. Wright, S. J., "Effects of finite-precision arithmetic on interior-point methods for nonlinear programming," Preprint ANL/MCS–P705–0198, Argonne National Laboratory, February, 1998. To appear in *SIAM Journal on Optimization*.

51. Wright, S. J., "On reduced convex QP formulations of monotone LCPs," *Mathematical Programming* 90 (2001), pp. 459–473.

52. Vicente, L. and Wright, S. J., "Local convergence of a primal-dual method for degenerate nonlinear programming," February, 2000. To appear in *Computational Optimization and Applications*.

Book Chapters and Other Refereed Publications:

1. McKinney, W. R. and Wright, S. J., "Parallel computations for blowup in a generalized Korteweg-de Vries-Burgers equation," Advances in Computer Methods for Partial Differential Equations VII, R. Vichnevetsky, D. Knight, G. Richter, eds., 1992, pp. 504–509.

2. Wright, S. J., "Applying new optimization algorithms to model predictive control," in *Chemical Process Control-V*, AIChE Symposium Series No. 316, Volume 93, CACHE Publications, 1997, pp. 147–155.

3. Wright, S. J., "Algorithms and software for linear and nonlinear programming," *Foundations of Computer-Aided Process Design*, AIChE Symposium Series, CACHE Publications, 1999.

4. Czyzyk, J., Owen, J. H., and Wright, S. J., "NEOS: Optimization on the Internet," *OR/MS Today* 24 (October, 1997), pp. 48–51.

5. Allgöwer, F., Badgwell, T. A., Qin, J. S., Rawlings, J. B., and Wright, S. J., "Nonlinear Predictive Control and Moving Horizon Estimation—An Introductory Overview" in *Advances in Control*, P. M. Frank, ed., Springer, 1999, pp. 391–449.

6. Wright, S. J., "Optimization software packages," in *Handbook of Applied Optimization*, M. Resende and P. Pardalos, eds., Oxford University Press, 2000 (to appear).

7. Wright, S. J. "Recent Developments in Interior-Point Methods," in *Systems Modeling and Optimization: Methods, Theory, and Applications*, M. J. D. Powell and S. Scholtes, eds., Kluwer, 2000, pp. 311–333.

8. Wright, S. J., "Solving Optimization Problems on Computational Grids," to appear in *Optima*, 2001.

Submitted Papers:

1. Wright. S. J., "Modifying SQP for degenerate problems," Preprint ANL/MCS–P699–1097, Argonne National Laboratory, November, 1997. Revised July, 2000. Submitted to *SIAM Journal on Optimization*.

2. Ren, Z., Sheng, R., and Wright, S. J., "Advanced computational techniques for Laue diffraction analysis," Preprint ANL/MCS–P740-0199, Argonne National Laboratory, January, 1999.

3. Wright, S. J. and Orban, D., "Properties of the log-barrier function on degenerate nonlinear programs," Preprint ANL/MCS–P772-0799, Argonne National Laboratory, July, 1999. Submitted to *Mathematics of Operations Research*.

4. Turlach, B. A., Venables, W. N., and Wright, S. J., "Simultaneous variable selection," October, 1999. Submitted to *Technometrics*.

5. Yıldırım, E. A. and Wright, S. J., "Warm-start strategies in interior-point methods for linear programming," Preprint ANL/MCS–P799–0300, Argonne National Laboratory, March, 2000. Submitted to *SIAM Journal on Optimization*.

6. Wright, S. J., "Constraint identification and algorithm stabilization for degenerate nonlinear programs," Preprint ANL/MCS–P865–1200, Argonne National Laboratory, December, 2000. Submitted to *Mathematical Programming, Series B*.

7. Linderoth, J. and Wright, S. J. "Implementing decomposition algorithms for stochastic programming on a computational grid," ANL/MCS-P875-0401, Argonne National Laboratory, April, 2001. Submitted to *Computational Optimization and Applications*.

8. Pannocchia, G., Wright, S. J., and Rawlings, J. B., "Existence and computation of infinite horizon model predictive control with active steady-state constraints," Preprint, May, 2001. Submitted to *IEEE Transactions on Automatic Control*.

Software/Hypertext:

1. PCx Interior-Point Code for Linear Programming. Most recent version described in *PCx User Guide* (Czyzyk, J., Mehrotra, S., Wagner, M., and Wright, S. J.), Optimization Technology Center Report 96/01, November, 1997. Code available from

   `www.mcs.anl.gov/otc/Tools/PCx/`

   See also *PCx User Guide: Supplement for Windows 95/NT*, (Czyzyk, J., Stolarski, M., and Wright, S. J.), Optimization Technology Center Report 97/03, 1997. Code available from

   `www.mcs.anl.gov/otc/Tools/PCx/Windows/`

2. NEOS Guide to Optimization (with other members of the Optimization Technology Center); see

   `www.mcs.anl.gov/otc/Guide/`

Other Conference Proceedings (selected):

1. Wright, S. J., Guarini, M. W., Palusinski, O. A., and Baker, G. R., "Transient analysis of dynamic systems using spectral techniques," Proceedings of the 1986 Phoenix Conference on Computers and Communications (IEEE Press, 1987), 117–120.

2. Palusinski, O. A. and Wright, S. J., "Spectral techniques in integration of partitioned systems," Proceedings of the 1985 Summer Computer Simulation Conference, 377–380.

3. Wright, S. J., "Numerical methods for control on shared-memory systems," Proceedings of the 28th IEEE Conference on Decision and Control (1989), 370–373.

4. Wright, S. J., "Structured interior point methods for optimal control," Proceedings of the 30th IEEE Conference on Decision and Control (1991), 1711–1716.

5. Corliss, G., Bischof, C., Griewank, A., Wright, S., and Robey, T. "Automatic differentiation for PDEs: Unsaturated flow case study," in Advances in Computer Methods for Partial Differential Equations VII, R. Vichnevetsky, D. Knight, and G. Richter, eds., 1992, pp. 150–156.

6. Stewart, D. E. and Wright, S. J., "Monotone convergent methods for a variational inequality," Proceedings of the Center for Mathematics and its Applications 33 (1994), 195–207.

7. Coleman, T. F., Czyzyk, J., Sun, C., Wagner, M., and Wright, S. J., "pPCx: Parallel interior-point software for linear programming," Proceedings of the SIAM Conference on Parallel Computing, 1997. (Published on CD-ROM.)

8. Wenzel, M., Czyzyk, J., and Wright, S. J., "Computational experience with a dense column feature for interior-point methods," to appear in Proceedings of the Meeting of the German Society on Operations Research, Jena, Germany, September, 1997. (expanded version available as Technical Memorandum ANL/MCS TM 227, July, 1997.)

9. Rao, C. V., Campbell, J. C., Rawlings, J. B., and Wright, S. J., "Efficient implementation of model predictive control for sheet and film forming processes," Proceedings of American Control Conference, Albuquerque, 1997.

Invited Talks since 1995:

Industrial and Systems Engineering Department, Georgia Institute of Technology, seminar, March, 1995.

Conference on Scientific Computing and Differential Equations, Stanford, minisymposium talk, March, 1995.

Electrical Engineering Department, Illinois Institute of Technology, seminar, April, 1995.

Computational and Applied Mathematics Department, Rice University, seminar, April 1995.

Midwest Numerical Analysis Day, University of Iowa, plenary talk, April 1995.

Institute for Computational Mathematics, Technical University of Dresden, two colloquia, June, 1995.

AMS Conference on Mathematics of Numerical Analysis, Park City, invited talk, July, 1995.

SIAM Annual Meeting, minisymposium talk, Charlotte, October, 1995.

Intl Conference on Complementarity Problems '95, Johns Hopkins University, invited talk, November, 1995.

Short course on Network-Enabled Optimization Software, Mathematics and Statistics Department, University of Melbourne, November, 1995.

Australian National University, Canberra, colloquium, December, 1995.

Chemical Process Control Conference CPC-V, plenary talk, January, 1996.

SIAM Optimization Meeting, Victoria, Canada, minisymposium talk, May, 1996.

SIAM Optimization meeting, Victoria, Canada, Short course on Optimization Algorithms, Software, and Environments, May, 1996.

Stockholm Optimization Days, invited talk, June, 1996.

Chemical Engineering Department, University of Wisconsin-Madison, seminar, September, 1996.

Mathematics Department, University of Notre Dame, seminar, October, 1996.

INFORMS meeting, Atlanta, invited talk, November, 1996.

Computer Science Department, Cornell University, seminar, November, 1996.

Computer Science Department, University of Houston, seminar, December, 1996.

Mathematical Optimization meeting, Oberwolfach, Germany, invited participant, January, 1997.

Computational and Applied Mathematics department, Rice University, colloquium, March, 1997.

XVI International Symposium on Mathematical Programming, Lausanne, three minisymposium talks, August, 1997.

Texas-Wisconsin Modeling and Control Consortium Annual Meeting, Madison, September, 1997.

INFORMS meeting, Dallas, two invited talks, October, 1997.

Cornell University, Applied Mathematics Colloquium, October, 1997.

Asia-Pacific Operations Research Symposium, Melbourne, Australia, minisymposium talk, November 1997.

Courant Institute, New York University, seminar, February, 1998.

INFORMS meeting, Montreal, invited talk, April, 1998.

Workshop on Nonlinear Optimization and its Applications, Erice, Sicily, invited talk, June, 1998.

NEMACOM Workshop, Hervey Bay, Australia, invited talk, July, 1998.

Advanced Computation Seminar series, Center for Mathematics and its Applications, Australian National University, July, 1998.

School of Mathematical Sciences, Australian National University, colloquium, August, 1998.

INFORMS meeting, Seattle, invited talk, November, 1998.

Department of Mathematics, University of Coimbra, Portugal, seminar, November, 1999.

INFORMS Chicago chapter, invited talk, January, 1999.

Electrical Engineering, Stanford University, seminar, February, 1999.

CERFACS, Toulouse, colloquium, March, 1999.

Computer Science Department, University of Chicago, colloquium, May, 1999.

International Conference on Complementarity Problems, Madison, Wisconsin, invited talk, June 1999.

TC7 Conference of IFIP, Cambridge, England, invited plenary talk, July, 1999.

Foundations of Computer-Aided Process Design, Breckinridge, Colorado, invited talk and panelist, July, 1999.

IBM T.J. Watson Research Center, Yorktown Heights, seminar, August, 1999.

ITAM, Mexico City, Mexico, colloquium, August, 1999.

European Control Conference, Karlsruhe, Germany, short course (with 3 colleagues), August, 1999.

Conference on Nonlinear Optimization, Coimbra, Portugal, invited talk, October, 1999.

INFORMS meeting, Philadelphia, invited talk, November, 1999.

Mathematics Department, University of Notre Dame, seminar, December, 1999.

AspenWorld, Florida, invited minisymposium talk, February, 2000.

Mathematics Department, Arizona State University, colloquium, March, 2000.

Conference Journées Mode, Université Paul Sabatier, Toulouse, plenary talk, March, 2000.

Applied Mathematical Programming and Modeling Conference, London, invited minisymposium talk, April, 2000.

Intl Symposium on Mathematical Programming, invited minisymposium talk, August, 2000.

Sloan School of Management, Massachusetts Institute of Technology, colloquium, October, 2000.

Applied Mathematics, California Institute of Technology, colloquium, November, 2000.

Department of Industrial Engineering, University of Michigan, seminar, February, 2001.

Department of Computer Science and Engineering, Pennsylvania State University, seminar, March, 2001.